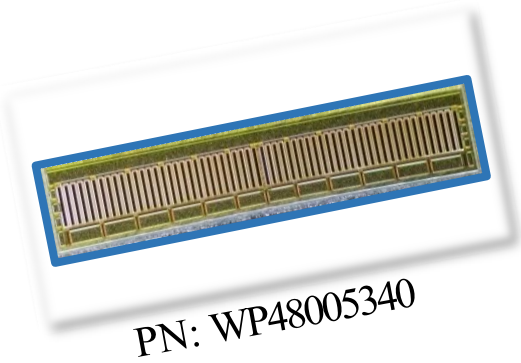
WAVE PIA

I C D E S I G N

WP48005340

340W, 48V GaN HEMT Die



PN: WP48005340

The WP48005340 is a 340W gallium nitride (GaN) High Electron Mobility Transistor (HEMT). This GaN HEMT is a wideband transistor optimized for 3.5GHz operation in a user-friendly device for high bandwidth applications. Gallium nitride (GaN) HEMT is a device optimized for 5G. GaN HEMT resistance is only 1/10 that of silicon transistors, making it capable of switching frequencies faster for greater energy efficiency.

Features

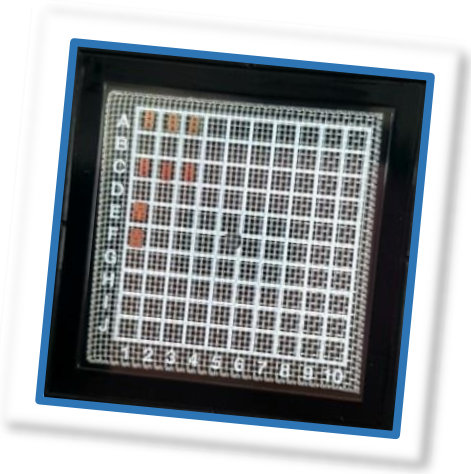
- Up to 5 GHz Operation
- 14.0 dB Typical Small Signal Gain @ 3.5 GHz
- 340 W Typical Psat @3.5GHz
- 48V Operation
- High Breakdown Voltage
- High Breakdown Voltage
- High Efficiency
- Reliability Monitoring Supporting

Applications

- U/VHF Amplifiers
- Broadband Amplifiers
- Base Station Communications
- Drone, UAV
- WiMAX, LTE, WCDMA, GSM
- WPT, V2X
- Radar application

Packaging Information

- Bare die are shipped in Wafer-level with Expander Ring or Gel-Pak® containers.
- Possible UV Curing for Wafer-level with dicing saw



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• Application Support: platune@wavepia.com

Absolute Maximum Ratings (not simultaneous) at 25˚C

Parameter	Parameter	Typical Value	Units	Conditions
Threshold voltage @ Id=1mA/mm, Vd=10V	V_{to}	-3.4	V	25°C
Breakdown voltage @ Id=1mA/mm	V_{DG}	160	V	25°C
Drain-source current, Id @ Vd=10V, Vg=0	I_{dss}	800	mA/mm	25°C
Operating Junction Temperature	T_J	225	°C	
Storage Temperature	T_{STG}	-65, +150	°C	
Thermal Resistance, Junction to Case (packaged)	$R_{\theta JC}$		°C/W	
Thermal Resistance, Junction to Case (die only)	$R_{\theta JC}$		°C/W	
Mounting Temperature (30 seconds)	T_S	320	°C	30 seconds

Electrical Characteristics (Frequency = 3.5 GHz unless otherwise stated; TC = 25˚C)

Parameter	Parameter	Typical Value	Units	Conditions
DC Characteristics				
Ohmic contact resistance	RC	0.3	Ohm-mm	25°C
Maximum Drain-source current, Id @ Vd=10V, Vg=1V (1X125μm device)	I_{dmax}	1000	mA/mm	25°C
Max. trans-conductance, @ Vd=10V, Vg=-4V ~ -1V (1X125μm device)	GM_PEAK	290	mS/mm	25°C
Maximum Drain-source current, Id @ Vd=10V, Vg=1V (1X125μm device)	I_{dmax}	1000	mA/mm	25°C
RF Characteristics				
Small Signal Gain	G_{SS}	>12	dB	V_{DD}=48V, I_{DQ}=2100mA
Saturated Power Output	P_{SAT}	340	W	V_{DD}=48V, I_{DQ}=2100mA
Drain Efficiency	η	>55	%	V_{DD}=48V, I_{DQ}=2100mA
Intermodulation Distortion	IM3	<-30	dBc	V_{DD}=48V, I_{DQ}=2100mA
Output Mismatch Stress	VSWR	10:1	ψ	

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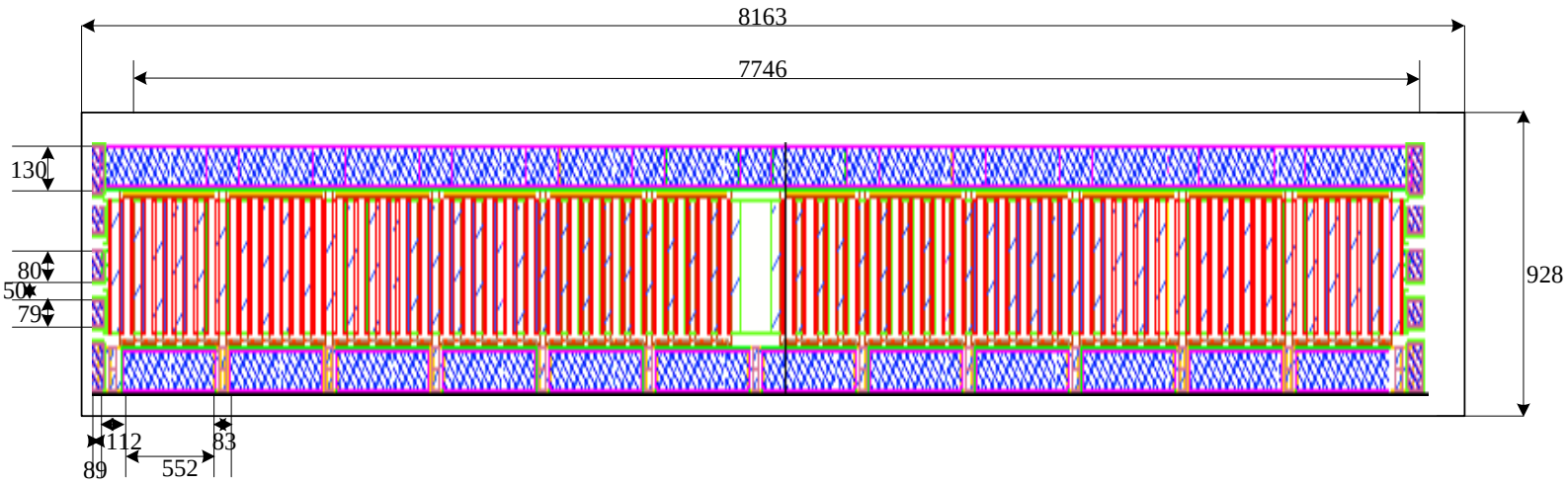
DIE Dimensions (units in microns)



Overall die size 8163 x 928 (+0/-50) microns, die thickness 100 (+/- 10) microns.
All Gate and Drain pads must be wire bonded for electrical connection.

Assembly Notes:

- Recommended solder is AuSn (80/20) solder. Refer to Wavepia's guide for the Eutectic Die Bond Procedure
- Vacuum collet is the preferred method of pick-up.
- The backside of the die is the Source (ground) contact.
- Die back side gold plating is 5 microns thick minimum.
- Thermosonic ball or wedge bonding are the preferred connection methods.
- Gold wire must be used for connections.

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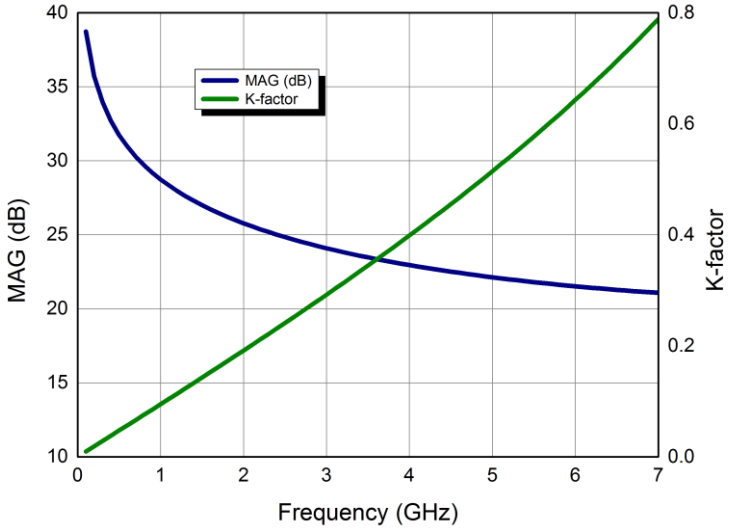
Typical Performance

Simulated Maximum Available Gain (MAG) and K Factor of the WP48005340

V_{DD} = 48 V, I_{DQ} = 2100 mA

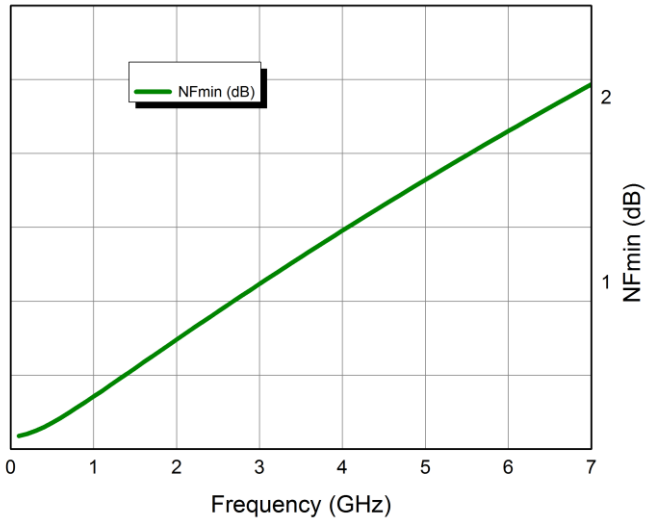


Intrinsic die parameters - reference planes at centers of gate and drain bonding pads. No wire bonds assumed.

Typical Performance

Simulated Minimum Noise Figure of the WP48005340

V_{DD} = 48 V, I_{DQ} = 2100 mA



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Typical Die S-Parameters

(Small Signal, V_{DS} = 48 V, I_{DQ} = 2100 mA, magnitude / angle)

Frequency	Mag S11	Ang S11	Mag S21	Ang S21	Mag S12	Ang S12	Mag S22	Ang S22
100MHz	0.984154	-165.172	18.59484	95.65216	0.002491	5.811143	0.900298	-178.335
200MHz	0.984014	-172.534	9.343989	90.29047	0.002503	0.608441	0.902581	-178.913
300MHz	0.984038	-174.995	6.224237	87.36694	0.002501	-2.15606	0.903362	-179.003
400MHz	0.984106	-176.221	4.657258	85.06452	0.002494	-4.29941	0.904047	-178.97
500MHz	0.984201	-176.952	3.713453	83.01802	0.002485	-6.18679	0.904809	-178.89
600MHz	0.984319	-177.435	3.081718	81.1069	0.002474	-7.93871	0.905684	-178.789
700MHz	0.984458	-177.778	2.628505	79.28066	0.002461	-9.60567	0.906679	-178.678
800MHz	0.984615	-178.032	2.286989	77.515	0.002446	-11.2119	0.907791	-178.564
900MHz	0.984789	-178.229	2.020028	75.79722	0.002429	-12.7702	0.909015	-178.449
1000MHz	0.984979	-178.384	1.805337	74.12031	0.00241	-14.2875	0.910342	-178.337
1100MHz	0.985183	-178.511	1.628733	72.48031	0.00239	-15.7677	0.911761	-178.229
1200MHz	0.985399	-178.616	1.480762	70.87496	0.002369	-17.2131	0.913263	-178.126
1300MHz	0.985627	-178.704	1.354879	69.30297	0.002346	-18.625	0.914837	-178.028
1400MHz	0.985864	-178.78	1.24641	67.76363	0.002322	-20.004	0.916473	-177.936
1500MHz	0.986109	-178.846	1.151926	66.25656	0.002297	-21.3506	0.91816	-177.851
1600MHz	0.98636	-178.904	1.068855	64.78155	0.002271	-22.6648	0.919889	-177.772
1700MHz	0.986617	-178.955	0.995229	63.33847	0.002244	-23.9469	0.921649	-177.699
1800MHz	0.986877	-179.002	0.929517	61.92722	0.002216	-25.197	0.923433	-177.633
1900MHz	0.98714	-179.044	0.870506	60.5477	0.002188	-26.415	0.925231	-177.573
2000MHz	0.987404	-179.083	0.817227	59.19975	0.002159	-27.6011	0.927036	-177.52
2100MHz	0.987669	-179.119	0.768892	57.88319	0.00213	-28.7556	0.92884	-177.473
2200MHz	0.987933	-179.153	0.724854	56.59775	0.002101	-29.8786	0.930638	-177.432
2300MHz	0.988196	-179.184	0.684579	55.34313	0.002071	-30.9705	0.932424	-177.396
2400MHz	0.988457	-179.214	0.647619	54.11898	0.002041	-32.0315	0.934192	-177.366
2500MHz	0.988715	-179.243	0.613596	52.92488	0.002011	-33.0621	0.935938	-177.34
2600MHz	0.988969	-179.27	0.582187	51.76037	0.001981	-34.0628	0.937658	-177.32
2700MHz	0.98922	-179.296	0.553119	50.62494	0.00195	-35.0339	0.939349	-177.304
2800MHz	0.989466	-179.322	0.526154	49.51805	0.00192	-35.9761	0.941009	-177.292
2900MHz	0.989708	-179.346	0.501085	48.43913	0.00189	-36.8899	0.942634	-177.284
3000MHz	0.989945	-179.37	0.477734	47.38757	0.00186	-37.7758	0.944223	-177.28
3100MHz	0.990176	-179.394	0.455942	46.36275	0.001831	-38.6345	0.945775	-177.279
3200MHz	0.990402	-179.417	0.435572	45.36403	0.001801	-39.4666	0.947288	-177.281
3300MHz	0.990622	-179.439	0.4165	44.39076	0.001772	-40.2727	0.948762	-177.286
3400MHz	0.990837	-179.461	0.398616	43.44227	0.001743	-41.0535	0.950196	-177.294
3500MHz	0.991046	-179.482	0.381824	42.5179	0.001715	-41.8097	0.95159	-177.304
3600MHz	0.991249	-179.504	0.366037	41.61699	0.001686	-42.5417	0.952944	-177.316
3700MHz	0.991447	-179.524	0.351175	40.73886	0.001658	-43.2504	0.954258	-177.33
3800MHz	0.991639	-179.545	0.337168	39.88285	0.001631	-43.9363	0.955532	-177.347
3900MHz	0.991825	-179.565	0.323953	39.04831	0.001604	-44.6001	0.956768	-177.364

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Typical Die S-Parameters

(Small Signal, V_{DS} = 48 V, I_{DQ} = 2100 mA, magnitude / angle)

Frequency	Mag S11	Ang S11	Mag S21	Ang S21	Mag S12	Ang S12	Mag S22	Ang S22
4000MHz	0.992005	-179.585	0.311471	38.2346	0.001577	-45.2423	0.957964	-177.384
4100MHz	0.99218	-179.605	0.29967	37.44107	0.001551	-45.8637	0.959123	-177.404
4200MHz	0.992349	-179.625	0.288501	36.66711	0.001525	-46.4648	0.960245	-177.426
4300MHz	0.992514	-179.644	0.277922	35.91209	0.001499	-47.0462	0.96133	-177.449
4400MHz	0.992673	-179.663	0.267892	35.17543	0.001474	-47.6084	0.96238	-177.473
4500MHz	0.992827	-179.682	0.258375	34.45654	0.001449	-48.152	0.963396	-177.497
4600MHz	0.992975	-179.701	0.249336	33.75485	0.001424	-48.6776	0.964378	-177.523
4700MHz	0.99312	-179.719	0.240746	33.0698	0.0014	-49.1857	0.965327	-177.549
4800MHz	0.993259	-179.737	0.232576	32.40087	0.001377	-49.6768	0.966245	-177.575
4900MHz	0.993394	-179.756	0.224799	31.74752	0.001354	-50.1513	0.967132	-177.603
5000MHz	0.993524	-179.774	0.217391	31.10925	0.001331	-50.6099	0.96799	-177.63
5100MHz	0.993651	-179.791	0.210329	30.48557	0.001308	-51.0528	0.968818	-177.658
5200MHz	0.993773	-179.809	0.203594	29.87601	0.001286	-51.4806	0.969619	-177.686
5300MHz	0.993891	-179.827	0.197166	29.2801	0.001265	-51.8936	0.970394	-177.714
5400MHz	0.994005	-179.844	0.191026	28.6974	0.001243	-52.2923	0.971142	-177.743
5500MHz	0.994115	-179.861	0.185159	28.12749	0.001222	-52.6772	0.971865	-177.772
5600MHz	0.994222	-179.878	0.179549	27.56994	0.001202	-53.0484	0.972565	-177.801
5700MHz	0.994326	-179.895	0.174181	27.02437	0.001181	-53.4065	0.973241	-177.83
5800MHz	0.994426	-179.912	0.169042	26.49037	0.001161	-53.7518	0.973894	-177.858
6000MHz	0.994522	-179.928	0.16412	25.96759	0.001142	-54.0845	0.974526	-177.887
6100MHz	0.994616	-179.945	0.159403	25.45566	0.001123	-54.4051	0.975137	-177.916
6200MHz	0.994706	-179.961	0.154879	24.95423	0.001104	-54.7138	0.975729	-177.945
6300MHz	0.994794	-179.977	0.15054	24.46298	0.001085	-55.0108	0.976301	-177.974
6400MHz	0.994879	-179.993	0.146375	23.98158	0.001067	-55.2965	0.976854	-178.002
6500MHz	0.994961	179.9909	0.142375	23.50971	0.001049	-55.5712	0.977389	-178.031
6600MHz	0.995041	179.9751	0.138532	23.04709	0.001031	-55.835	0.977908	-178.059
6700MHz	0.995118	179.9594	0.134838	22.59343	0.001014	-56.0883	0.978409	-178.088
6800MHz	0.995192	179.9438	0.131285	22.14844	0.000997	-56.3312	0.978895	-178.116
6900MHz	0.995265	179.9283	0.127867	21.71187	0.00098	-56.5639	0.979365	-178.144
7000MHz	0.995335	179.913	0.124577	21.28345	0.000963	-56.7867	0.979821	-178.172

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